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CENTRAL INTELLIGENCE AGENCY REPORT

INFORMATION REPORT

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COUNTRY USSR

DATE DISTR. 25 August 1948

SUBJECT Military Geology

NO. OF PAGES 4

PLACE ACQUIRED

NO. OF ENCLS. (LISTED BELOW)

DATE OF INFORMATION

SUPPLEMENT TO REPORT NO.

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SUMMARY

MILITARY GEOLOGY

Chapter 10. AIRDROMES

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Airplanes spend a great deal of time on the ground, where they are more vulnerable to enemy attack than in the air. This makes it necessary to protect airdromes in the theater of military operations and to improve the airdrome net.

The geologist has an important function to perform in the construction of airfields.

Types of Airdromes

Military airdromes are either permanent, used for training and testing, or temporary. Airdromes intended as bases for army air forces (VVS) in action are called operational airdromes.

Operational airdromes are classified as: (1) active or base fields which are actually in use by the air force; (2) reserve fields which make possible the change of bases, after which they become active; (3) landing strips used for occasional landings; and, (4) decoys for camouflage purposes.

A group of airdromes intended as a base for a definite air unit is called an "airdrome junction." It is composed of [illegible] or two active, two or three reserve, and one or two decoy fields. Airdrome junctions are kept 8 to 20 km apart, and the decoys are 2 or 3 km from the others, in the direction of probable enemy attack.

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The combination of all junctions and individual airdromes serving a definite area, front, or army, is called an airdrome network /aerodromnaya set'/.

Terrain Requirements

An airdrome consists of two parts -- the ground surface and the aerial space where the planes operate. The ground surface is composed of the flying field, the approach strip, the service apron, and the living quarters. A permanent airdrome must have all these. The ground surface of an airdrome may be of the platform type or the strip type. The platform type may be circular, square, triangular, rectangular, or oval. Most frequently, however, the platform types are of irregular construction and lend themselves better to camouflage.

Strip-type airdromes are chiefly used in areas where the wind blows in a definite direction, for example in mountain valleys. These fields consist of either one or two strips, usually 1,200 to 1,500 meters long and 300 to 500 or 600 meters wide (Figure 84). The size and type of field are determined by the types of planes it is to accommodate, climatic and geological conditions, and elevation above sea level.

The following are considered as terrain requirements:

1. The flight area must be sufficiently large.

2. The surface must be even.

3. The surface of the landing and take-off sections must be of sufficient carrying capacity and free from dust.

4. It is desirable that the landing and take-off sections be covered with clayey or sandy podsol soils and black earth up to 0.4 meter thick, and that underneath there be good filtering strata.

5. The depth of the water table should be one meter.

6. The terrain should be such as to facilitate the secrecy of location of airdromes.

7. Airdromes should be provided with sources of water supply.

Airdrome surfaces are of two types -- natural turf and artificial surfaces. The latter type is the most desirable as it permits uninterrupted use of the airdrome during all seasons of the year.

Drainage of airdromes is a vital problem of maintenance and the geologist must devote a good deal of attention to it. He should collect topographical and hydrogeological data for the airdrome area, use prospecting pits for the measurement of water tables, and study the course of projected drainage canals.

The following are the steps to be taken in draining an operational airdrome:

1. Protection of the flying field from the influx of water from the outside.

2. Drainage of surface water from the flying field itself.

3. Lowering of the level of the water table of the flying field.

4. Regulation and cleaning of the water intakes.

The problem of drainage is followed by a consideration of the airdrome's water supply.

When a flying field is located in a river bottom or on the seashore, dams and hillside ditches are constructed to hold back the river or sea water.

Engineering-Geological, Hydrogeological, and Ground-Soil Investigations

The geologist's basic tasks in the projection and construction of airdromes are the following:

1. Establishment of the general geological and hydrogeological nature of the area selected for construction of the airdrome

2. Detailed exploration of the ground along the lines of the runways, taxiways, and drainage canals

3. Classification of the grounds and soils and the characteristics of their occurrence

4. Study of subsoil waters

5. Study of the characteristics of the ground as a basis for the runways (VVP), taxiways (RD), and engineering constructions

6. Establishment of the categories of ground on the basis of their constructional properties and degree of workability.

An airdrome with a simplified runway and taxiway made of rubbly gravel requires roughly 20,000 cubic meters of stone and 20,000 cubic meters of sand. An airdrome with a permanent runway requires 36,000 cubic meters of stone and 20,000 cubic meters of sand.

The task of geological engineering and soil research falls into two phases -- a general survey of all available information on the area (maps, tabulated material) and a field investigation with drilling of prospecting pits and spot tests of the soils, followed by a more detailed study of the area and laboratory work to establish the granulometric composition of soil, its specific gravity, moisture, filtration coefficient, plasticity (for clayey soils), and coefficient of internal friction.

The number of prospecting pits to be sunk is determined by the peculiarities of the structure of the area and the hydrogeology of the section, and also by the purpose for which the airdrome is intended.

When the relief is unbroken and the soil layers are continuous, the number of prospecting pits required in constructing an airdrome with artificial covering should be about eight to ten for each runway, but no less than one pit for every 200 meters along the axis of the runway and 6 to 10 meters within the limits of the flying field. Prospecting pits are located in a checkerboard arrangement within the limits of the projected runways, taxiways, and main drainage canals on both sides for a distance of 60 meters from the axis of the runway, 15 meters from the axis of the taxiway and 3 meters from the axis of the main drainage canal. The depth of the prospecting pits is usually 1.5 to 2.0 meters. One quarter of the pits are water-control pits sunk to the level of the water table. The number of soil-testing pits is determined by the structure of the soil layers of the area.

As a result of this ground-soil, engineering-geological, and hydrogeological research, the military geologist must draw up basic conclusions concerning the possibility of using a selected area for the construction of a flying field and also for the runway and taxiway. His conclusions should include the following:

1. A short description of the meso- and microrelief of the area

2. A geological and hydrogeological description of the area, which should give a characterization of the ground soils to a depth of 2 to 3 meters, the behavior of the subsoil waters, and the influence of atmospheric precipitation on the firmness of the top ground

3. Determination of the freezing depth of the ground

4. Description of the general stability of the area with relation to landslips, cave-ins, gaps, cavernous formations, etc.

5. Means of draining the area

6. General deductions of the possibility of construction of the airdrome and the location of the runway and taxiway in accordance with the projected layout.

The conclusions should be accompanied by the following graphic materials:

1. A contour map of the airdrome sector on a scale of 1:5000, indicating location of prospecting pits sunk during field investigations and wells, with high-water marks of the area in time of floods.

2. Cross sections of the prospecting pits on the scale of 1:50

3. Tabulations of weather information and data on the structure of the ground-soil layers

4. Ground-soil maps of the whole flying field

5. Maps of the maximum high and low levels of the water table (with dates)

6. Cross section of the ground soils along the layout of the runway and taxiway, with water-table level indicated

7. Results of the laboratory analyses of the soils and water.

In case there are unfavorable soils present (such as loess, peat, etc.) the results of special research must be included and necessary measures indicated.

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